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08

**Fall**

ΕΡΓΑΣΙΑ ΠΛΗΡΟΦΟΡΙΚΗΣ- ΕΞΑΜΗΝΟ Η’

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# Atmospheric chemistry observational databases

Over the last two centuries many ecological chemical observations have been made from a variety of ground-based, flying, and orbital platforms and deposited in databases. Many of these databases are openly available. All of the instruments mentioned in this article give online communal access to their data. These observations are critical in developing our understanding of the Earth's atmosphere and issues such as climate change, ozone depletion and air quality. Some of the external links provide repositories of many of these datasets in one place. For example, the Cambridge Atmospheric Chemical Database, is a large database in a uniform ASCII format. Each observation is augmented with the meteorological conditions such as the temperature, potential temperature, geopotential height, and equivalent PV latitude.

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## Ground-based and balloon observations

The Network for the Detection for Stratospheric Change (NDSC) is a set of high-quality remote-sounding research stations for observing and understanding the physical and chemical state of the stratosphere. Ozone and key ozone-related chemical compounds and parameters are targeted for measurement. The NDSC is a major component of the international upper atmosphere research effort and has been endorsed by national and international scientific agencies, including the International Ozone Commission, the United Nations Environment Programme (UNEP), and the World Meteorological Organization (WMO). The primary instruments and measurements are: Ozone lidar (vertical profiles of ozone from the tropopause to at least 40 km altitude; in some cases tropospheric ozone will also be measured). Temperature lidar (vertical profiles of temperature from about 30 to 80 km). Aerosol lidar (vertical profiles of aerosol optical depth in the lower stratosphere). Water vapor lidar (vertical profiles of water vapor in the lower stratosphere). Ozone microwave (vertical profiles of stratospheric ozone from 20 to 70 km). H2O microwave (vertical profiles water vapor from about 20 to 80 km). ClO microwave (vertical profiles of ClO from about 25 to 45 km, depending on latitude). Ultraviolet/Visible spectrograph (column abundance of ozone, NO2, and, at some latitudes, OClO and BrO). Fourier Transform Infrared spectrometer (column abundances of a broad range of species including ozone, HCl, NO, NO2, ClONO2, and HNO3). MkIV observations. The MkIV Interferometer is a Fourier Transform Infra-Red (FTIR) Spectrometer, designed and built at the Jet Propulsion Laboratory in 1984, to remotely sense the composition of the Earth's atmosphere by the technique of solar absorption spectrometry. This was born out of concern that man-made pollutants (e.g. chlorofluorocarbons, aircraft exhaust) might perturb the ozone layer Since 1984, the MkIV Interferometer has participated in 3 NASA DC-8 polar aircraft campaigns, and has successfully completed 15 balloon flights. In addition, the MkIV Interferometer made over 900 days of ground-based observations from many dfeifrent locations, including McMurdo, Antarctica in 1986. Sonde observations. The World Ozone and Ultraviolet Radiation Data Centre (WOUDC) is one of five World Data Centres which are part of the Global Atmosphere Watch (GAW) programme of the World Meteorological Organization (WMO). The WOUDC is operated by the Experimental Studies Division of the Meteorological Service of Canada (MSC) — formerly Atmospheric Environment Service (AES), Environment Canada and is located ino rTonto. The WOUDC began as the World Ozone Data Centre (WODC) in 1960 and produced its first data publication of Ozone Data for the World in 1964. In June 1992, the AES agreed to a request from the WMO to add ultraviolet radiation data to the WODC. The Data Centre has since been renamed to the World Ozone and Ultraviolet Radiation Data Centre (WOUDC) with the two component parts: the WODC and the World Ultraviolet Radiation Data Centre (WUDC).

## Airborne observations

Aircraft observations. Many aircraft campaigns have been conducted as part of theS uborbital Science Program and by the Earth Science Project Ofice an overview of these campaigns is available. The data can be accessed from the Earth Science Project Of fice archives. MOZAIC observations. The MOZAIC program (Measurement of OZone and water vapour by AIrbus in-service airCraft) was initiated in 1993 by European scientists, aircraft manufacturers and airlines to collect experimental data. Its goal is to help understand the atmosphere and how it is changing under the influence of human activ, itwyith particular interest in the efects of aircraft. MOZAIC consists of automatic and regular measurements of ozone and water vapour by five long range passenger airliners flying all over the world. The aim is to build a large database of measurements to allow studies of chemical and physical processes in the atmosphere, and hence to validate global chemistry transport models. MOZAIC data provide, in particula, rdetailed ozone and water vapour climatologies at 9– 12 km where subsonic aircraft emit most of their exhaust and which is a very critical domain (e.g. radiatively and S/T exchanges) still imperfectly described in existing models. This will be valuable to improve knowledge about the processes occurring in the upper troposphere/ lower stratosphere (UT/LS), and the model treatment of near tropopause chemistry and transport. The MOZAIC data is restricted access, to obtain access thfeo rms need to be filled out. CARIBIC observations. The CARIBIC (Civil Aircraft for the Regular Investigation of the atmosphere Based on an Instrument Container) project is an innovative scientific project to study and monitor important chemical and physical processes in the Earth's atmosphere. Detailed and extensive measurements are made during long distance flights on board the Airbus A340-600 "Leverkusen" (http://www.flightradar24.com/data/airplanes/D-AIHE/). We deploy an airfreight container with automated scientific apparatuses, which are connected to an air and particle (aerosol) inlet underneath the aircraft. In contrast to MOZAIC, CARIBIC is only installed on one aircraft, but it measures a much wider spectrum of atmospheric constituents C( ARIBIC -> instrumentation). Both, CARIBIC and MOZAIC are integrated in IAGOS. Data exist from 1998-2002 and from 2004-today . It can be requested via CARIBIC -> data access.

## Space shuttle observations

ATMOS observations. The Atmospheric Trace Molecule Spectroscopy experiment (ATMOS) is an infrared spectrometer (a Fourier transform interferometer) that is designed to study the chemical composition of the atmosphere. In this section you will be able to read both general and detailed information as to why and how the instrument works. The ATMOS instrument has flown four times on the Space Shuttle since 1985. The predecessor to ATMOS, flown on aircraft and high-altitude balloon platforms, was born in the early 1970s out of concern for the effects of Super Sonic Transport exhaust products on the ozone laye.r The experiment was redesigned for the Space Shuttle when the potential for ozone destruction by man-made chlorofluorocarbons was discovered and the need for global measurements became crucial. CRISTA observations. CRISTA is short for CRyogenic Infrared Spectrometers and Telescopes for the Atmosphere. It is a limb-scanning satellite experiment, designed and developed by the University of Wuppertal to measure infrared emissions of the Earth's atmosphere. Equipped with three telescopes and four spectrometers and cooled with liquid helium, CRISTA acquires global maps of temperature and atmospheric trace gases with very high horizontal and vertical resolution. The design enables the observation of small scale dynamical structures in the 15–150 km altitude region.

## Satellite observations

ACE observations. The Atmospheric Chemistry Experiment (ACE) satellite, also known as SCISAT-1, is a Canadian satellite that makes measurements of the Earth's atmosphere and follows in heritage ofT AMOS. Aura observations. Aura flies in formation with the NASA EOS "A Train," a collection of several other satellites (Aqua, CALIPSO, CloudSat and the French PARASOL). Aura carries four instruments for studies of atmospheric chemistry: MLS, HIRDLS, TES and OMI.ILAS observations. ILAS (Improved Limb Atmospheric Spectrometer) developed by MOE (the Ministry of the Environment) (formerly EA - Environment Agency of Japan) is boarded on ADEOS (Advanced Earth Observing Satellite). On August 17, 1996, ADEOS was launched by the H-II rocket from thea Tnegashima Space Center of Japan (ADEOS was renamed as "MIDORI") and stopped its operation on June 30, 1997. Data obtained by ILAS are processed, archived, and distributed by NIES (National Institute for Environmental Studies). POAM observations. The Polar Ozone and Aerosol Measuremen t67 II (POAM II) instrument was developed by the Naval Research Laboratory (NRL) to measure the vertical distribution of atmospheric ozone, water vap,o nr itrogen dioxide, aerosol extinction, and temperature. POAM II measures solar extinction in nine narrow band channels, covering the spectral range from approximately 350 to 1060 nm. Sulfate aerosol observations from SAGE and HALOE. The SAGE II (Stratospheric Aerosol and Gas Experiment II) sensor was launched into a 57 degree inclination orbit aboard the Earth Radiation Budget Satellite (ERBS) in October 1984. During each sunrise and sunset encountered by the orbiting spacecraft, the instrument uses the solar occultation technique to measure attenuated solar radiation through the Earth's limb in seven channels centered at wavelengths ranging from 0.385 to 1.02 micrometers. The retrieval of stratospheric aerosol size distributions based on HALOE multi-wavelength particle extinction measurements was described by Hervig et al. [1998]. That approach yields unimodal lognormal size distributions, which describe the aerosol concentration versus radius using three parameters: total aerosol concentration, median radius, and distribution width. Thissi te offers results based on the Hervig et al. [1998] technique, with one exception. The retrieval results reported here are based on sulfate refractive indices for 215 K, where Hervig et al. [1998] used room temperature indices adjusted to stratospheric temperatures using the Lorentz-Lorenz rule. Size distributions were only retrieved at altitudes above tropospheric cloud tops. Clouds were identified using techniques described by Hervig and McHugh [1999]. The HALOE size distributions are offered in NetCDF files containing data for as ingle year. The results are reported on a uniform altitude grid ranging from 6 to 33 km at 0.3 km spacing. The native HALOE altitude spacing is 0.3 km, so this interpolation has little or no effect on the data. The files report profile data including: altitude, pressure, temperature, aerosol concentration, median radius, distribution width, aerosol composition. Aerosol surface area and volume densities can be easily calculated from the size distribution parameters using the relationships givehne re. Upper Atmosphere Research Satellite (UARS) observations. Data from the UARS is available from theG ES Distributed Active Archive Center (DAAC). The UARS satellite was launched in 1991 by the Space Shuttle Discovery. It is 35 feet (11 m) long, 15 feet (4.6 m) in diameter, weighs 13,000 pounds, and carries 10 instruments. UARS orbits at an altitude of 375 miles (604 km) with an orbital inclination of 57 degrees. UARS measured ozone and chemical compounds found in the ozone layer which afef ct ozone chemistry and processes. UARS also measured winds and temperatures in the stratosphere as well as the energy input from the Sun together, these helped define the role of the upper atmosphere in climate and climate variability.

## Related observations

Surface albedo. The surface reflectivity is of importance for atmospheric photolysis. Instruments such as the Total Ozone Mapping Spectrometer (TOMS) and the Ozone Monitoring Instrument (OMI) provide daily global fields.

## See also

Acid rain

Atmospheric chemistry

Greenhouse gas

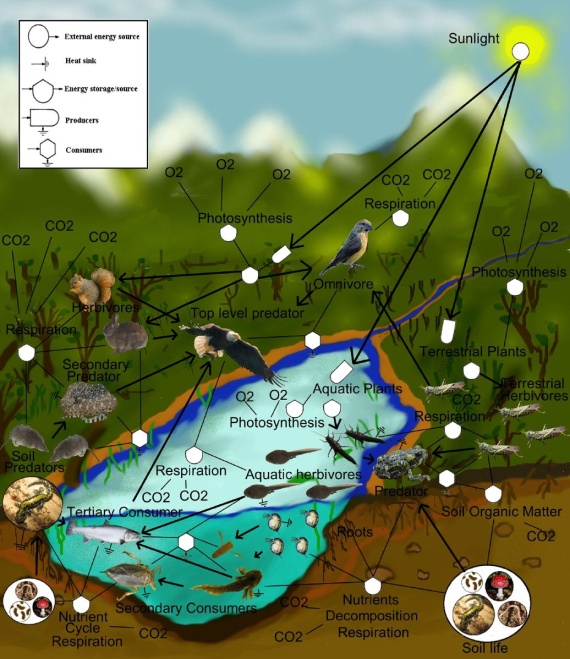
International Global Atmospheric Chemistry

Ozone

Pollution

Scientific Assessment of Ozone Depletion

# Biocoenosis

A biocenosis (UK English, biocoenosis , also biocenose , biocoenose , biotic community , biological community , ecological community , life assemblage, ) coined by Karl Möbius in 1877, describes the interacting organisms living together in a habitat (biotope).[1] In the palaeontological literature, the term distinguishes "life assemblages", which reflect the original living community, living together at one place and time. In other words, it is an assemblage of fossils or a community of specific time, which is different from "death assemblages" (thanatocoenoses).[2] No palaeontological assemblage will ever completely represent the original biological community (i.e. the biocoenosis, in the sense used by an ecologist); the term thus has somewhat different meanings in a palaeontological and an ecological context.[2] Based on the concept of biocenosis, ecological communities can take in various forms

A freshwater aquatic and terrestrial web

* Zoocenosis for the faunal community,
* Phytocenosis for the flora community,
* Microbiocenosis for the microbial community.

The geographical extent of a biocenose is limited by the requirement of a more or less uniform species composition.

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## Ecosystems

An ecosystem, originally defined by Tansley (1935), is a biotic community (or biocenosis) along with its physical environment (or biotope ). In ecological studies, biocenosis is the emphasis on relationships between species in an area. These relationships are an additional consideration to the interaction of each species with the physical environment.

## Biotic communities

Biotic communities vary in size, and larger ones may contain smaller ones. Species interactions are evident in food or feeding relationships. A method of delineating biotic communities is to map the food network to identify which species feed upon which others and then determine the system boundary as the one that can be drawn through the fewest consumption links relative to the number of species within the boundary. Mapping biotic communities is important identifying sites needing environmental protection, such as the British Site of Special Scientific Interest (SSSIs). The Australian Department of the

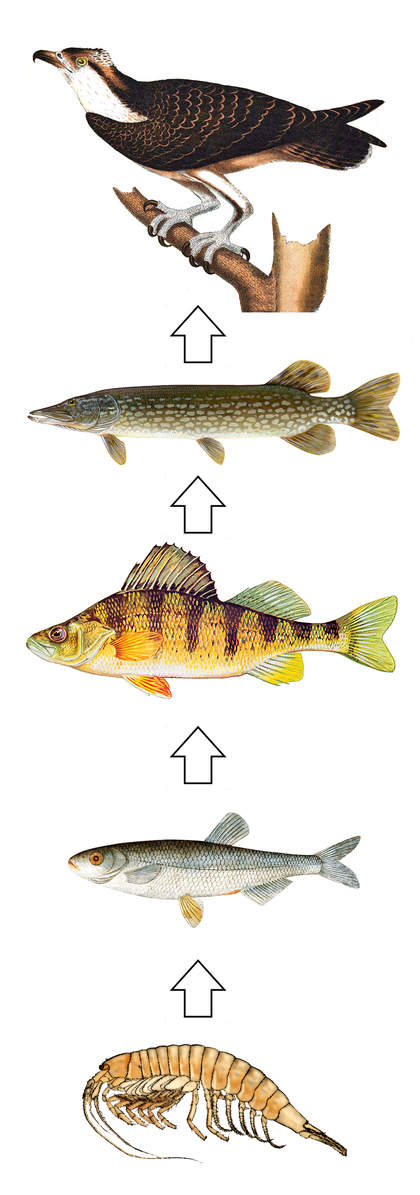
Environment and Heritage maintains a register of Threatened Species and Threatened Ecological Communities under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

## See also

The side of a tide pool showing sea star

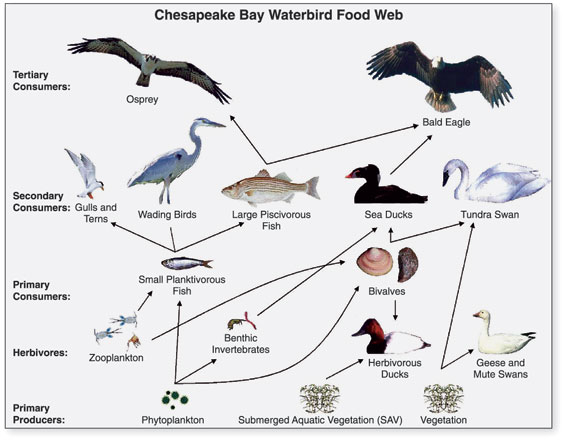
* Community (ecology)
* Hylozoism
* Population biology

# Food chain

A food chain is a linear network of links in a food web starting from producer organisms (such as grass or trees which use radiation from the Sun to make their food) and ending at apex predator species (like grizzly bears or killer whales), detritivores (like earthworms or woodlice), or decomposer species (such as fungi or bacteria). A food chain also shows how the organisms are related with each other by the food they eat. Each level of a food chain represents a different trophic level. A food chain differs from a food web, because the complex network of different animals' feeding relations are aggregated and the chain only follows a direct, linear pathway of one animal at a time. Natural interconnections between food chains make it a food web. A common metric used to quantify food web trophic structure is food chain length. In its simplest form, the length of a chain is the number of links between a trophic consumer and the base of the web and the mean chain length of an entire web is the arithmetic average of the lengths of all chains in a food web.[1][2] Food chains were first introduced by the African-Arab scientist and philosopher Al-Jahiz in the 9th century and later popularized in a book published in 1927 by Charles Elton, which also introduced the food web concept.[3][4][5]

Food chain in a Swedish lake

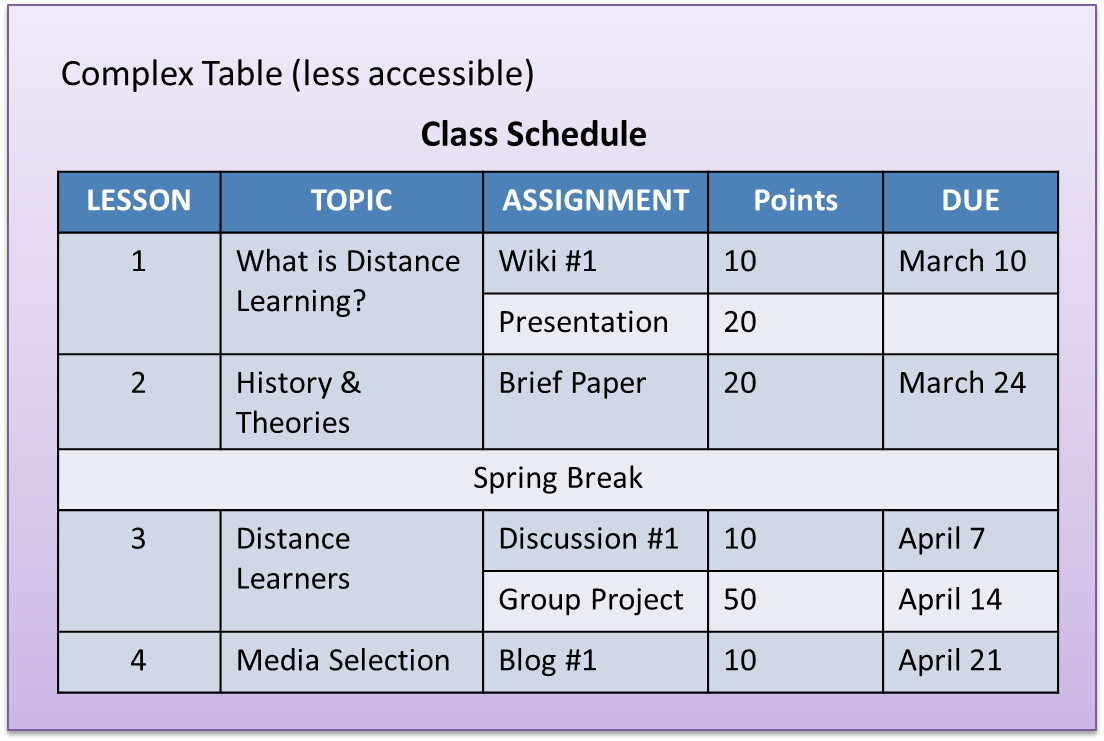
## Food chain length

The food chain's length is a continuous variable that provides a measure of the passage of energy and an index of ecological structure that increases in value counting progressively through the linkages in a linear fashion from the lowest to the highest trophic (feeding) levels.[7] Food chains are often used in ecological modeling (such as a three species food chain). They are simplified abstractions of real food webs, but complex in their dynamics and mathematical implications.[8] Ecologists have formulated and tested hypotheses regarding the nature of ecological patterns associated with food chain length, such as increasing length increasing with ecosystem size, reduction of energy at each successive level, or the proposition that long food chain lengths are unstable.[7] Food chain studies have an important role in ecotoxicology studies tracing the pathways and biomagnification of environmental contaminants.[9]

A network of food chains

Producers, such as plants, are organisms that utilize solar or chemical energy to synthesize starch. All food chains must start with a producer. In the deep sea, food chains centered on hydrothermal vents and cold seeps exist in the absence of sunlight. Chemosynthetic bacteria and archaea use hydrogen sulfide and methane from hydrothermal vents and cold seeps as an energy source (just as plants use sunlight) to produce carbohydrates; they form the base of the food chain. Consumers are organisms that eat other organisms. All organisms in a food chain, except the first organism, are consumers. In a food chain, there is also reliable energy transfer through each stage. However, all the energy at one stage of the chain is not absorbed by the organism at the next stage. The amount of energy from one stage to another decreases[ .10]

## See also

* Heterotroph
* Lithotroph
* Trophic pyramid
* Predator-prey interaction
* 

# Paleosol

In the geosciences, paleosol (palaeosol in Great Britain and Australia) can have two meanings. The first meaning, common in geology and paleontology, refers to a former soil preserved by burial underneath either sediments (alluvium or loess) or volcanic deposits (volcanic ash), which in the case of older deposits have lithified into rock. In Quaternary geology, sedimentology, paleoclimatology, and geology in general, it is the typical and accepted practice to use the term "paleosol" to designate such "fossil soils " found buried within either sedimentary or volcanic deposits exposed in all continents as illustrated by Rettallack (2001),[1] Kraus (1999),[2] and other published papers and books. In soil science, paleosols are soils formed long periods ago that have no relationship in their chemical and physical characteristics to the present-day climate or vegetation. Such soils form on extremely old continental cratons and as small scattered localities in outliers of ancient rock.

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## Properties

Because of the changes in the Earth's climate over the last fifty million years, soils formed under tropical rainforest (or even savanna) have become exposed to increasingly arid climates which cause former oxisols, ultisols or even alfisols to dry out in such a manner that a very hard crust is formed. This process has occurred so extensively in most parts of Australia as to restrict soil development - the former soil is effectively the parent material for a new soil, but it is so unweatherable that only a very poorly developed soil can exist in present dry climates, especially when they have become much drier during glacial periods in the Quaternary.

In other parts of Australia, and in many parts of Africa, drying out of former soils has not been so severe. This has led to large areas of relict podsols in quite dry climates in the far southern inland of Australia (where temperate rainforest was formerly dominant) and to the formation of torrox soils (a suborder of oxisols) in southern Africa. Here, present climates allow, effectively, the maintenance of the old soils in climates under which they could not actually form if one were to start with the parent material on which they developed in the Mesozoic and Paleocene.

Paleosols in this sense are always exceedingly infertile soils, containing available phosphorus levels orders of magnitude lower than in temperate regions with younger soils. Ecological studies have shown that this has forced highly specialised evolution amongst Australian flora[3] to obtain minimal nutrient supplies. The fact that soil formation is simply not occurring makes ecologically sustainable management even more difficult. However, paleosols often contain the most exceptional biodiversity due to the absence of competition.[4]

## Applications

### Paleoclimate reconstructions

Paleosols record certain aspects of the climate in which they formed. Quaternary paleosols in particular have been widely used to determine past environmental conditions, such as paleo-precipitation and mean temperature[5].

### Paleobotany

Paleosols are an important archive of information about ancient ecosystems and various components of fossil soils can be used to study past plant life. Paleosols often contain ancient plant materials such as pollen grains and phytoliths, a biomineralized form of silica produced by many plants such as grasses. Both pollen and phytolith fossils from different plant species have characteristic shapes that can be traced back to their parent plants.[6] Over long geological time scales, phytoliths may not necessarily be preserve in paleosols due to ability of the poorly crystalline silica to dissolve.

Another indicator of plant community composition in paleosols is thcea rbon isotopic signature. The ratio of different carbon isotopes in organic matter in paleosols reflects the proportions of plants using C3 photosynthesis, which grow in cooler and wetter climates, versus plants using C4 photosynthesis, which are better adapted to hotter and drier conditions.[7] Other methods for detecting past plant life in paleosols are based on identifying the remains olfe af waxes, which are slow to break down in soils over time[8 . ]

## See also

* Paleopedology
* Paleopedological record
* Pedogenesis
* Pedology (soil study)
* Korshov

# Plant community

A plant community (sometimes "phytocoenosis" or "phytocenosis") is a collection or association [1] of plant species within a designated geographical unit, which forms a relatively uniform patch, distinguishable from neighboring patches of different vegetation types. The components of each plant community are influenced by soil type, topography, climate and human disturbance. In many cases there are several soil types within a given phytocoenosis. [2]

A plant community can be described floristically (the species it contains) and/or physiognomically (its physical structure). For example, a forest (a community of trees) includes the overstory, or upper tree layer of the canopy, as well as the understory, further subdivided into the shrub layer, herbaceous layer, and sometimes also moss layer. In some cases of complex forests there is also a well-defined lower tree layer. A plant community is similar in concept to a vegetation type, with the former having more of an emphasis on the ecological association of species within it, and the latter on overall appearance by which it is readily recognized by a layperson.

Heathland plant community at Tasmania AU

A plant community can be rare even if none of the major species defining it are rare.This is because it is the association of species and relationship to their environment that may be rare.[1]:115 An example is the Sycamore Alluvial Woodland in California dominated by the California sycamore Platanus racemosa. The community is rare, being localized to a small area of California and existing nowhere else, yet the California sycamore is not a rare tree in California.

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An example is a grassland on the northern Caucasus Steppes, where common grass species found are Festuca sulcata and Poa bulbosa . A common sedge in this grassland phytocoenosis is Carex shreberi . Other representative forbs occurring in these steppe grasslands are Artemisia austriaca and Polygonum aviculare.[3]

An example of a three tiered plant community is in Central Westland of South Island, New Zealand. These forests are the most extensive continuous reaches of podocarp/broadleaf forests in that country. The overstory includes miro, rimu and mountain totara. The mid-story includes tree ferns such as Cyathea smithii and Dicksonia squarrosa , whilst the lowest tier and epiphytic associates include Asplenium polyodon , Tmesipteris tannensis , Astelia solandri and Blechnum discolor.

## See also

* Community (ecology)
* Association (ecology)
* size-asymmetric competition
* Ecosystem
* Habitat
* Phytosociology
* Salt Marsh
* Stand level modelling

# Η οικογένειά μου (Τασούλη)